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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>5</sup> :  A61F 13/15, 13/20	A1	(11) International Publication Number: WO 91/16871 (43) International Publication Date: 14 November 1991 (14.11.91)
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(21) International Application Number: PCT/US90/02302  
(22) International Filing Date: 30 April 1990 (30.04.90)

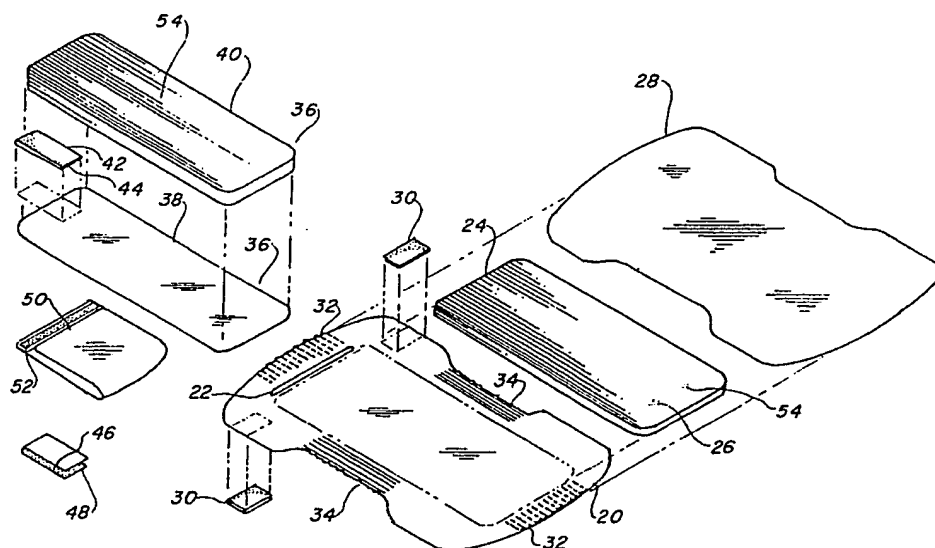
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(81) Designated States: AT (European patent), AU, BE (European patent), BR, CA, CH (European patent), DE (European patent)\*, DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GB (European patent), HU, IT (European patent), JP, KR, LU (European patent), MC, NL (European patent), NO, RO, SE (European patent), SU, US.

Published  
With international search report.

(54) Title: DOUBLE-USE DIAPER



## (57) Abstract

A disposable diaper which has a liquid impervious backsheet (20) on which absorbent padding (24) is affixed and a liquid penetrating top sheet (28) attached on the periphery. Tape fasteners (30) attach overlapping sides of the backsheet for securing to the wearer. A slit (22) in the backsheet permits a moisture absorbing insert (36) to be added between the top sheet and the padding allowing withdrawal when saturated. The insert has a back (38), a pad (40) and a tab (42) with a wetness indicator integrally formed. A disposable pouch (50) may be optionally added for containment of the insert when removed. Double-use utility is created when the insert is removed, the diaper contains clean padding for further wear and use as with a conventional disposable diaper.

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DOUBLE-USE DIAPERTECHNICAL FIELD

5 The invention pertains to the general field of  
diapers and more particularly to diapers having an  
additional absorbent insert that is removable while  
still being worn, allowing double usage for extended  
wear.

BACKGROUND ART

10 Developments in diapers for incontinent children  
and adults has intensified in the last few years. This  
intensification is due to a more affluent society  
enjoying the convenience of disposing of the soiled  
garment rather than washing the material to remove the  
urine and fecal matter.

15 Since prior art has been active, considerable  
improvement has been made in attempting to produce a  
disposable diaper that protects the person from being  
in contact with the moisture by absorbing the liquids  
in large quantities, changing the liquid to a gel and  
20 shielding the outside surface from moisture  
penetration.

While these refinements enhance the diaper's  
abilities, the utility remains unchanged. Prior art  
has yet to develop a disposable diaper that  
25 incorporates the latest features while adding an  
improvement that allows a more convenient and longer  
lasting usage further prolonging the comfort of the  
wearer.

A search of the prior art did not disclose any patents that read directly on the claims of the instant invention however, the following U.S. patents were considered related:

	<u>PATENT NO.</u>	<u>INVENTOR</u>	<u>ISSUED</u>	
5	2,577,398	Blake	4 December	1951
	2,584,898	McConnell	5 February	1952
	2,627,859	Hargrave	10 February	1953
	3,045,675	Brown	24 July	1962
10	3,658,064	Pociluyko	25 April	1972
	3,693,621	Jarusik et al	26 September	1972
	4,022,211	Timmons et al	10 May	1977
	4,114,621	Mims, Jr.	19 September	1978
	4,231,370	Mroz et al	4 November	1980
15	4,244,368	Caradona	13 January	1981
	4,507,121	Leung	26 March	1985
	4,738,674	Todd et al	19 April	1988

Pociluyko teaches a disposable absorbent diaper pad and separate garment allowing the pad to be changed also supported in the proper position on a wearer. The pad is made of layers of soft fibrous materials, one of which is in direct contact with the fluids facilitating ready disintegration. This pad material contains the properties allowing flushing in a toilet while the garment may be cleaned and reused. It will be noted that the garment must be removed from the wearer in order to detach the pad as a pocket is formed in the front and back.

Jarusik et al employ a holding device for retaining an elongated absorbent pad on a supporting garment. This invention includes the combination of a supporting garment, a pad having the side regions folded over and attached to a center region through adhesive tacks and a holding device fastened to the garment supporting the pad. Since the pad is secured

under the device no means is available to slide the pad out, short of complete removal of the garment.

5 Mims, Jr. discloses an easily disposable liner having provisions for sampling devices and dampness condition indicators. The shape of the liner precludes its removal while still on the wearer as it has two large rounded areas connected in the middle forming a narrow portion at the crotch of the patient.

10 Garadona employs a single incontinent garment which is adapted to receive and mount either a disposable liner or a reusable liner. The garment contains inwardly projecting snap fasteners around the waist that attach to mating fasteners on the liner. A protective strap in the form of removable fabric strips  
15 or tapes having fasteners, engage the male fasteners on the garment thus allowing attachment of the liner without direct contact of the snaps to the wearer's body creating neutralizing means. As the liner in either case is the only method of absorbing body  
20 fluids, its removal while still on the wearer would be of no utility and the separate straps would be a useless appendage.

Wetness indicators per se have been in use in  
25 diapers for some time in various forms and types the most common is a wicking strip with the moisture indicating substance in the material. As an example, water-soluble dye in a water-soluble polyvinyl alcohol binder has been used and a dye in a masking agent such as talcum powder has also been taught. Litmus is also  
30 well known in the art indicating wetness by changing color in the presence of an acid or alkali. Timmons et al, Mroz et al, Leung and Todd et al, all disclose wetness indicators in one form or another.

35 For background purposes and as indicative of the art to which the invention relates, reference may be made to the remaining cited patents including Blake,

McConnell, Brown and Hargrave.

DISCLOSURE OF THE INVENTION

5        There are occasions when it is very inconvenient  
to change a diaper particularly, when changing an  
infant during times when an adaptable surface is not  
available and yet the diaper is saturated and must be  
removed to maintain the liquid within the diaper's  
outer cover. It is therefore the primary object of the  
invention to employ a removable moisture absorbent  
10       insert that is easily slipped out of a diaper that  
remains attached to the wearer and still have the basic  
absorption surface in the diaper itself. This object  
allows extended use and yet is not as bulky as if the  
entire absorbent material were to be employed all of  
15       the usable time. The convenience for this type of  
diaper as well as the ease of removing the insert,  
without discomfort to the wearer, is indeed an  
advancement in the art.

20       The insert is configured with rounded ends and a  
narrow width combined with a fixed layer of  
non-absorbent material between the insert and the  
wearer. The inserts configuration allows easy  
withdrawal and any scraping along the skin or genitals  
is eliminated as the basic non-absorbent material is  
25       integrally connected to the garment.

30       An important object of the invention is the use  
of a moisture proof layer on the insert positioned  
opposite the wearer. This layer protects the main  
diaper material and allows handling by the attendant  
without direct contact with the body liquids. Further,  
the moisture proof layer allows the insert to be  
completely saturated and if it is not changed, the  
urine will simply overflow into the absorbent material

of the base diaper.

Another object of the invention is directed toward the use of a wetness indicator on the removable insert that alerts the attendant that the insert is  
5 completely saturated. This indication is accomplished using techniques well known in the art such as litmus paper that changes color in the presence of acid or alkali. The wicking effect is used to allow the indicator to be seen without complete removal from the  
10 diaper.

Still another object of the invention allows the use of a deodorizer in both the removable insert and the absorbent material of the main diaper. This material is also well known in the art and its use  
15 enhances the desirability for the user by eliminating undesirable odors.

Yet another object of the invention is the addition of a moisture resistant detachable pouch for containing the used removable insert. The pouch is  
20 sized to retain the rolled up insert and includes a closure allowing storage until it may be conveniently disposed of.

It will be noted that the removable insert is not made for disjoining when the wearer has a bowel  
25 movement. In this case, the entire diaper is removed and discarded in a normal manner.

These and other objects and advantages of the present invention will become apparent from the subsequent detailed description of the preferred  
30 embodiment and the claims taken in conjunction with the accompanying drawings.



BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a partial isometric view of the preferred embodiment viewed from the rear.

FIGURE 2 is a top plan (inside) view of the preferred embodiment with a cutaway portion illustrating the insert beneath the top sheet.

FIGURE 3 is a bottom (outside) view of the preferred embodiment illustrating the insert protruding from the diaper.

FIGURE 4 is a cross-sectional view taken along lines 4-4 of FIGURE 3.

FIGURE 5 is a plan view of the moisture absorbing insert removed from the diaper for clarity.

FIGURE 6 is a cross-sectional view taken along lines 6-6 of FIGURE 5.

FIGURE 7 is an exploded view of the invention.

BEST MODE FOR CARRYING OUT THE INVENTION

The best mode for carrying out the invention is presented in terms of a preferred embodiment depicted pictorially in FIGURES 1-7. A liquid impervious  
5 backsheet 20, generally rectangular in shape, forms the outside surface of the diaper and is configured with inwardly contoured sides such that it will fit the lower torso region of a human body when overlapped on the sides. FIGURES 3 and 7 depict this backsheet 20  
10 which is made of a flexible thermoplastic film such as polyethylene or the like. This backsheet 20 is much like the ones found on most modern disposable diapers except that it contains a slit 22 near the back edge. This slit 22 is almost one third the width of the  
15 backsheet 20 at its widest part or slightly shorter than the narrowest portion at the middle.

Absorbent padding 24 is attached to the top of the backsheet 20 and is located so that the slit 22 is not obstructed. This padding 24 is compressed  
20 sufficiently to maintain integrity of form by gluing, thermal bonding or other methods well known in the art. Further, the padding 24 may contain hydrocolloid polymer particles 26 or other super absorbent substances, that are intermixed within the fibers allowing human liquid  
25 waste to react changing the liquid into a gel thereby retaining it within the absorbent padding. The padding 24 itself may be any type well known in the art and commonly used for this utility such as wood pulp fibers, multiple plies of creped cellulosic webbing,  
30 absorbent cotton, rayon fibers and the like.

A liquid penetrating top sheet 28 covers the padding 24 and is attached to the backsheet 20 on the entire periphery. This topsheet 28 is preferably a  
35 thin flexible sheet of moisture pervious material such

as polypropylene, again well known in the art, that separates the padding 24 from the wearer's body eliminating the feeling of continued wetness. As this material is attached only on the outside surface, the central portion is unobstructed. Body fluids pass easily through this material and into the padding 24 beneath.

In order to attach the diaper to the wearer, the sides are overlapped and securing means are employed to make the attachment. Pressure sensitive tape fasteners 30 are preferred which are temporarily connected to the diaper inside and when peeled-off are fastened to the outer surface of the overlap.

The ends that form the waist and the sides, that are contoured for the legs, further contain an elasticized waist 32 and elasticized leg cuffs 34 on each side of the backsheet 20 for conforming to the wearer's waist and legs. These elasticized areas are preferably formed by a plurality of elastic strands affixed to the backsheet such that pleating is formed when not in use and stretching occurs when the diaper is worn. Other methods of elasticizing are equally well suited for this purpose.

A moisture absorbing insert 36 is retained between the padding 24 and the top sheet 28. One end of the insert is almost touching the front of the backsheet 20 and the other end protrudes slightly from the slit 22 in the backsheet 20 allowing withdrawal from the diaper when it becomes saturated with liquid without removing the complete diaper from the wearer. The insert 36 has a back 38 of liquid impervious flexible material of the same composition as the backsheet 20 and is basically rectangular in shape.

Fixably juxtapositioned on the insert back 38 is a moisture absorbing insert pad 40. This pad has the same characteristics as the padding 24 and is fastened

thereunto forming a removable secondary moisture absorbing surface completely separate from the balance of the diaper. The configuration of this insert allows liquid in the form of body wastes to penetrate the  
5       diapers top sheet 28 and be absorbed in the pad 40. The pad 40 may also contain the same hydrogel substance 26 intermixed within the fibers accomplishing the same purpose as above actually allowing the diaper almost twice the capacity for liquid absorbency.

10       An insert tab 42 is connected to the insert back 38 and pad 40 providing a handle to extract the insert from within the diaper. This tab 42 may also incorporate a wetness indicator 44 in the form of  
15       litmus paper, water soluble dye or a myriad of other substances well known in the art that change color when in contact with a liquid in the form of urine from the wearer. The tab 42 is so configured and formed of a material allowing a wicking action to take place  
20       bringing the fluid in contact with the wetness indicator 44 denoting saturation without destroying the integrity of the barrier between the moisture and the wearer.

      The tab 42 is illustrated attached in FIGURES 1, 3-6 and is shown by itself in FIGURE 7. The attachment  
25       of the tab 42 to the insert back 38 may be by any method such as heat fusion, adhesive, sewing and the like. In order to allow the insert 36 to be easily handled and disposed of, pressure sensitive adhesive 46 may be incorporated on the insert tab 42 overlayed with  
30       a removable cover 48. When the insert 36 is saturated and removed from the diaper, it may be rolled up and retained with the adhesive 46 on the tab 42. Alternately, the pressure sensitive adhesive 46 and cover 48 may be separately embodied from the tab 42 as  
35       illustrated in FIGURE 7 and in either case, the utility is the same.

A disposable pouch 50 may be positioned under the insert 36 and removed simultaneously through the slit 22. This optional feature may be added particularly for traveling where disposal of the insert may not be easily accomplished and the attendant must retain the used insert separately. The pouch 50 preferably contains an integral closure 52 allowing sealing, completely eliminating the possibility of leakage in the stored condition. As this pouch 50 is an option, it is illustrated only in FIGURE 7, however, in use it is simply placed flat between the padding 24 of the diaper and the insert back 38 or may be included anywhere with the diaper with equal ease.

A deodorizer 54 may be added to the diaper and insert 36 to reduce the perception of odor of the body waste retained therein.

In use, the diaper is placed on the infant, child or adult as the case may be in a usual manner overlapping the sides of the backsheet 20 and joining with the tape fasteners 30. When the insert 36 becomes saturated, the wetness indicator 44 changes color and the attendant withdraws the insert 36 from the diaper by grasping the tab 42 and pulling upward. Since the topsheet 20 is between the wearer and the insert or padding 24, this transfer is easily accomplished without any particular unpleasantness. The insert 36 is then rolled up and fastened with adhesive 46 on the tab 42 and disposed of or if the pouch is utilized, it is placed inside and sealed with the closure 52. The diaper now has the padding 24 clean and fresh and may be worn as an ordinary disposable diaper creating the double use utility.

While the invention has been described in complete detail and pictorially shown in the accompanying drawings it is not to be limited to such details, since many changes and modifications may be made in the invention without departing from the spirit and the scope thereof. For example, the diaper can be designed with the slit 22 located near the diaper front edge. Thus, allowing the insert 36 to be withdrawn from the front of the diaper. Additionally, the insert 36 may be used by placing it over the diaper top sheet of a conventional diaper to thus function as the primary recipient of body fluids. In this mode, after the insert is soiled, it is removed and discarded to allow the diaper to be available for second use. Hence, it is described to cover any and all modifications and forms which may come within the language and scope of the claims.

CLAIMS

1. A disposable diaper capable of dual use comprising:

- 5 a) a liquid impervious backsheet of a generally rectangular shape having a front, a back and sides, the backsheet having a slit near an edge of the back and the sides inwardly contoured into a shape that fits a human lower torso region when overlapped on a wearer's sides,
- 10 b) absorbent padding fixably juxtapositioned on the backsheet, positioned such that the slit is not obstructed, the padding defining disposable containment and storage of body wastes,
- 15 c) a liquid penetrating top sheet covering the padding and backsheet attached to the backsheet all around precluding the feeling of wetness to the wearer,
- 20 d) means to secure the sides together around the wearer, and
- 25 e) a moisture absorbing insert, having a first end and a second end, contained between the padding and the top sheet, with the first end almost touching the front of the backsheet and the second end protruding slightly from the slit in the backsheet allowing withdrawal when saturated with body fluids without
- 30 removing the diaper from the wearer.

2. The diaper as recited in claim 1 further comprising an elasticized waist on the front and back of the backsheet for conforming exactly to the wearer's waist.

5           3. The diaper as recited in claim 2 wherein said elasticized waist further comprises a plurality of elastic strands affixed thereto such that pleating is formed when not in use and stretching when attached to a person.

10           4. The diaper as recited in claim 1 further comprising an elasticized leg cuffs on each sides of the backsheet for exactly conforming to the wearer's legs.

15           5. The diaper as recited in claim 4 wherein said elasticized leg cuffs further comprise a plurality of elastic strands affixed thereto such that pleating is formed when not in use and stretching when attached to a person.

20           6. The diaper as recited in claim 1 wherein the absorbent padding has an additional layer of wood fluff intermixed with a gel forming substance allowing liquid waste to react changing the liquid into a gel allowing retention thereof within the padding.

25           7. The diaper as recited in claim 1 wherein said moisture absorbing insert further comprises:

- 30           a) an insert back of liquid impervious flexible material in rectangular shape,  
            b) a moisture absorbing insert pad fixably juxtapositioned on the insert back for containment and storage of liquid body wastes, and



c) an insert tab connected to the insert back and insert pad providing a handle to extract the insert from the diaper.

5        8. The diaper as recited in claim 7 wherein said insert tab further comprises: a wetness indicator visually depicting moisture saturation within the insert through color change alerting the attendant that the diaper needs replacing.

10       9. The diaper as recited in claim 8 wherein said wetness indicator further comprises: litmus paper changing color when in contact with body fluids due to wicking action bringing fluid in contact with the tab when the insert is completely saturated.

15       10. The diaper as recited in claim 8 wherein said wetness indicator further comprises water soluble dye changing color of the tab when in contact with body fluids due to wicking action bringing fluid in contact with the tab when the insert is completely saturated.

20       11. The diaper as recited in claim 7 wherein said insert tab further comprises: pressure sensitive adhesive on the insert tab allowing the tab to be adhered to the insert back when rolled up for disposal thereof.

25       12. The diaper as recited in claim 7 further comprising: a disposable pouch juxtapositioned with the moisture absorbing insert back in a removable manner allowing containment of the removed insert for disposal thereof.

13. The diaper as recited in claim 12 wherein said disposable pouch further comprises: a closure integral with the pouch allowing the pouch to be sealed.

5           14. The diaper as recited in claim 7 wherein said moisture absorbing insert further comprises: super absorbent gel forming substance intermixed within a filler material such as wood fluff allowing liquid waste to react changing the liquid into a gel allowing  
10           retention thereof within the pad.

15           15. The diaper as recited in claim 7 further comprising a deodorizer dispersed within the padding and the insert pad for absorbing odors of body wastes retained therein.

15           16. An improved disposable diaper capable of dual use having a liquid impervious backsheet, absorbent padding fixably juxtapositioned on the backsheet, a liquid penetrating top sheet covering the padding and the backsheet with means to secure the  
20           diaper to the wearer, the improvement comprises:

          a) said backsheet having a slit near a back edge,

          b) a moisture absorbing insert, having a first end and a second end, contained between the padding and the top sheet, with the first end  
25           almost touching a front portion of the backsheet and the second end protruding slightly from the slot in the backsheet allowing withdrawal when saturated with body fluids without removing the diaper from the  
30           wearer,

          c) said moisture absorbing insert further having:

- 5 (1) an insert back of liquid impervious flexible material in rectangular shape,  
(2) a moisture absorbing insert pad fixably juxtapositioned on the insert back for containment and storage of liquid body wastes, and  
10 (3) an insert tab connected to the insert back and insert pad providing a handle to extract the insert from the outside of the diaper.

15 17. The diaper as recited in claim 16 wherein said insert tab further comprises: a wetness indicator visually depicting moisture saturation within the insert through color change alerting the attendant that the diaper needs replacing.

20 18. The diaper as recited in claim 16 wherein said insert tab further comprises: pressure sensitive adhesive on the insert tab allowing the tab to be adhered to the insert back when rolled up for disposal thereof.

25 19. The diaper as recited in claim 16 further comprising: a disposable pouch juxtapositioned with the moisture absorbing insert back in a removable manner allowing containment of the removed insert for disposal thereof.

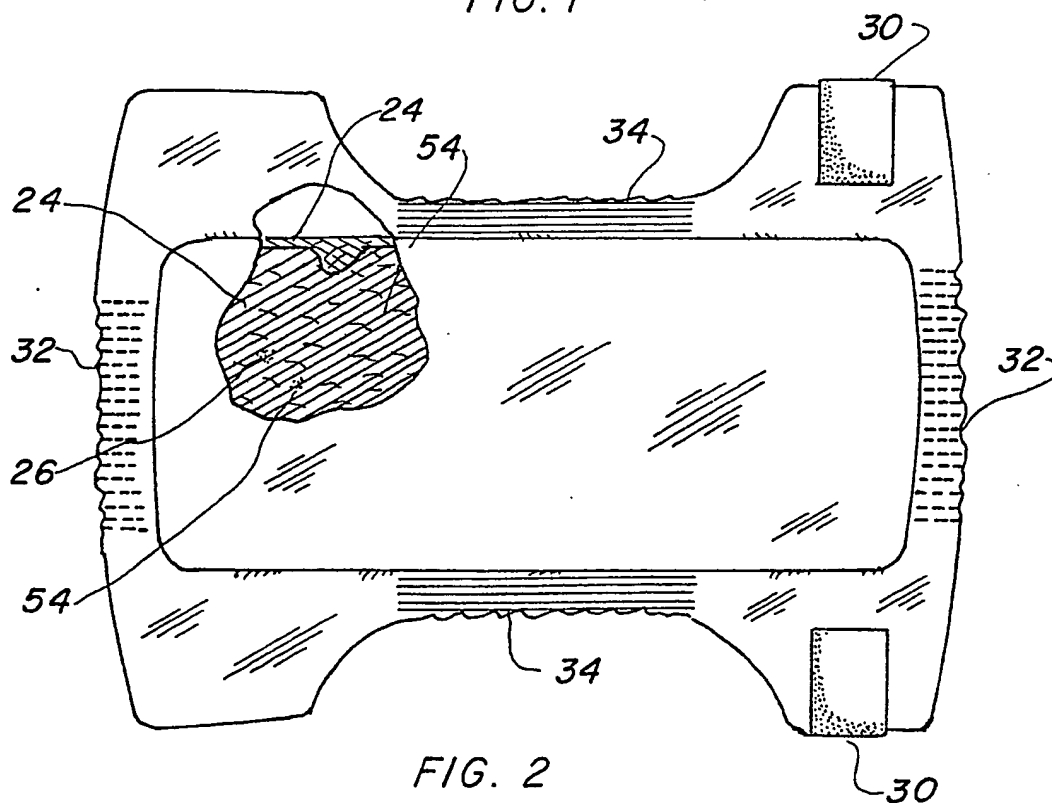
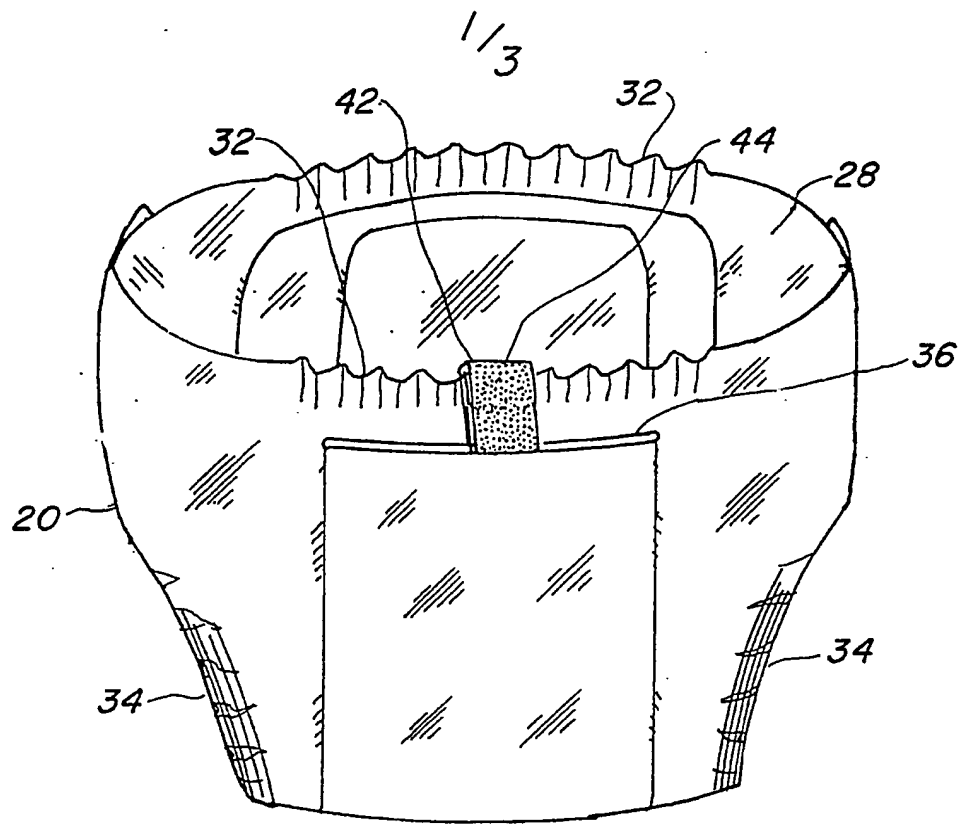
20. The diaper as recited in claim 19 wherein said disposable pouch further comprises: a closure integral with the pouch allowing the pouch to be sealed.

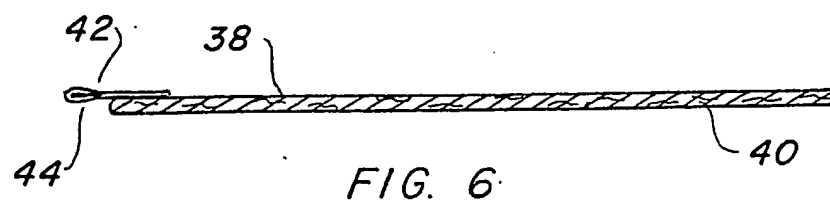
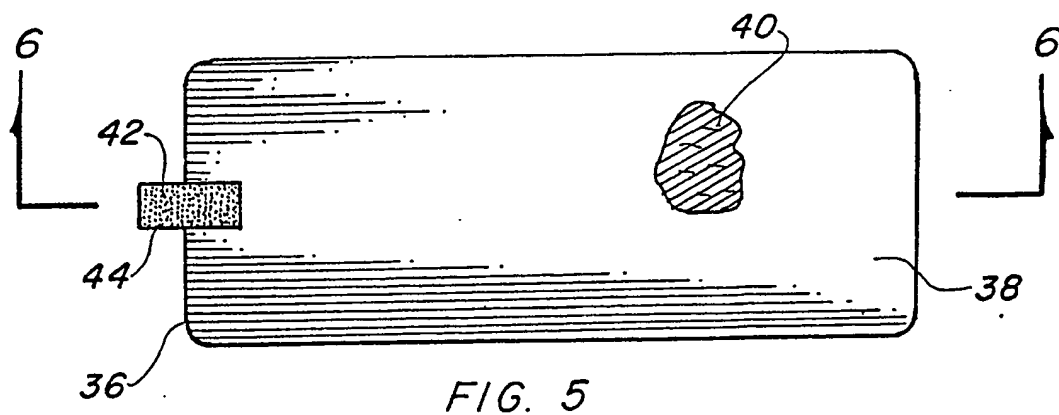
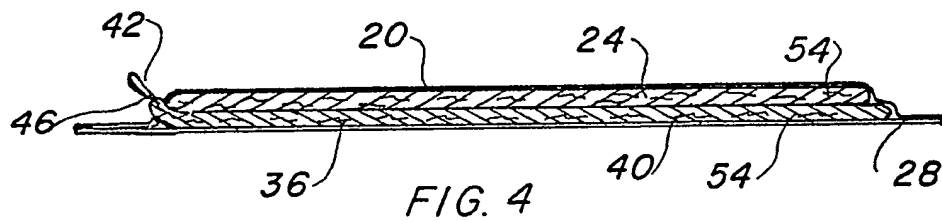
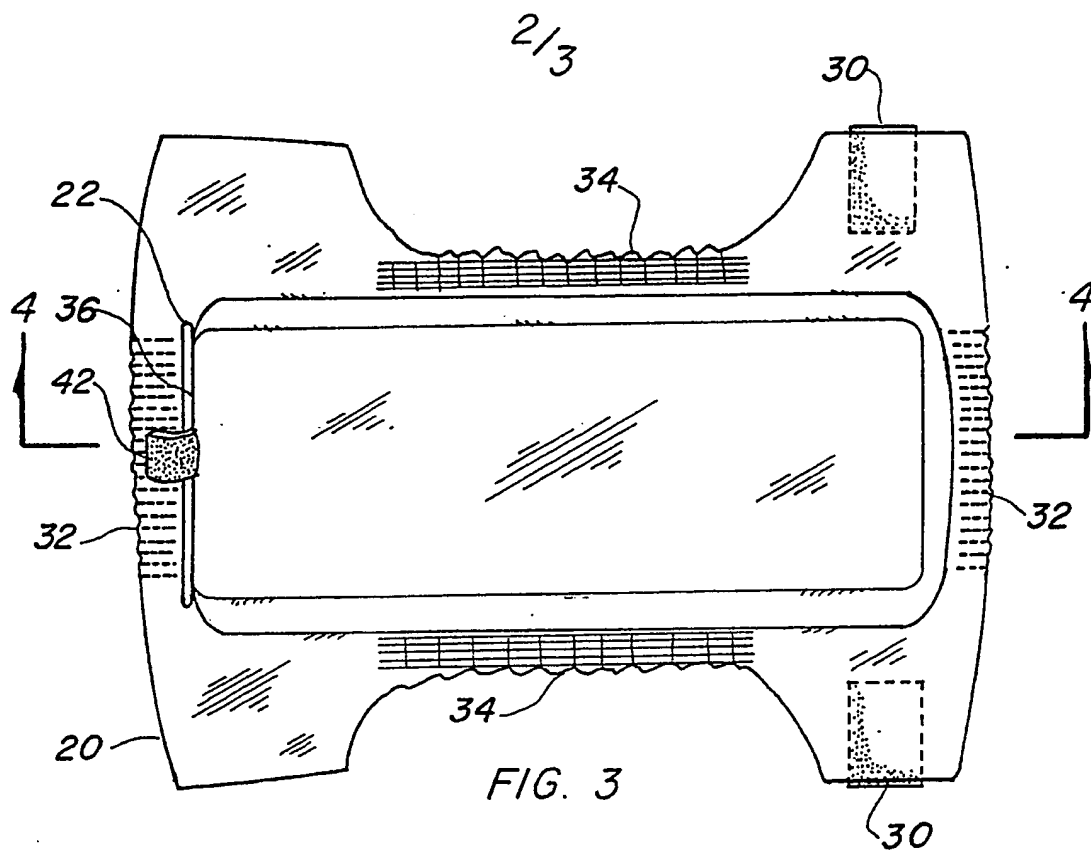
21. The diaper as recited in claim 16 wherein said moisture absorbing insert further comprises: hydrogel particles intermixed within the insert pad allowing liquid waste to react changing the liquid into a gel thereby retaining it within the pad.

22. The diaper as recited in claim 16 further comprising deodorizer dispersed within the padding and the insert pad for absorbing odors of body wastes retained therein.

23. A disposable diaper capable of dual use comprising:

- a) a conventional disposable diaper, and
- b) a moisture absorbing insert placed over the top sheet of the diaper to thus function as the primary recipient of body fluids, whereupon soiling said insert is removed and discarded allowing the diaper to be available for a second use, where said insert comprises:
  - (1) an insert back of liquid impervious flexible material in rectangular shape,
  - (2) a moisture absorbing insert pad fixably juxtapositioned on the insert back for containment and storage of liquid body wastes, and
  - (3) an insert tab connected to the insert back and insert pad providing a handle to extract the insert from the diaper.





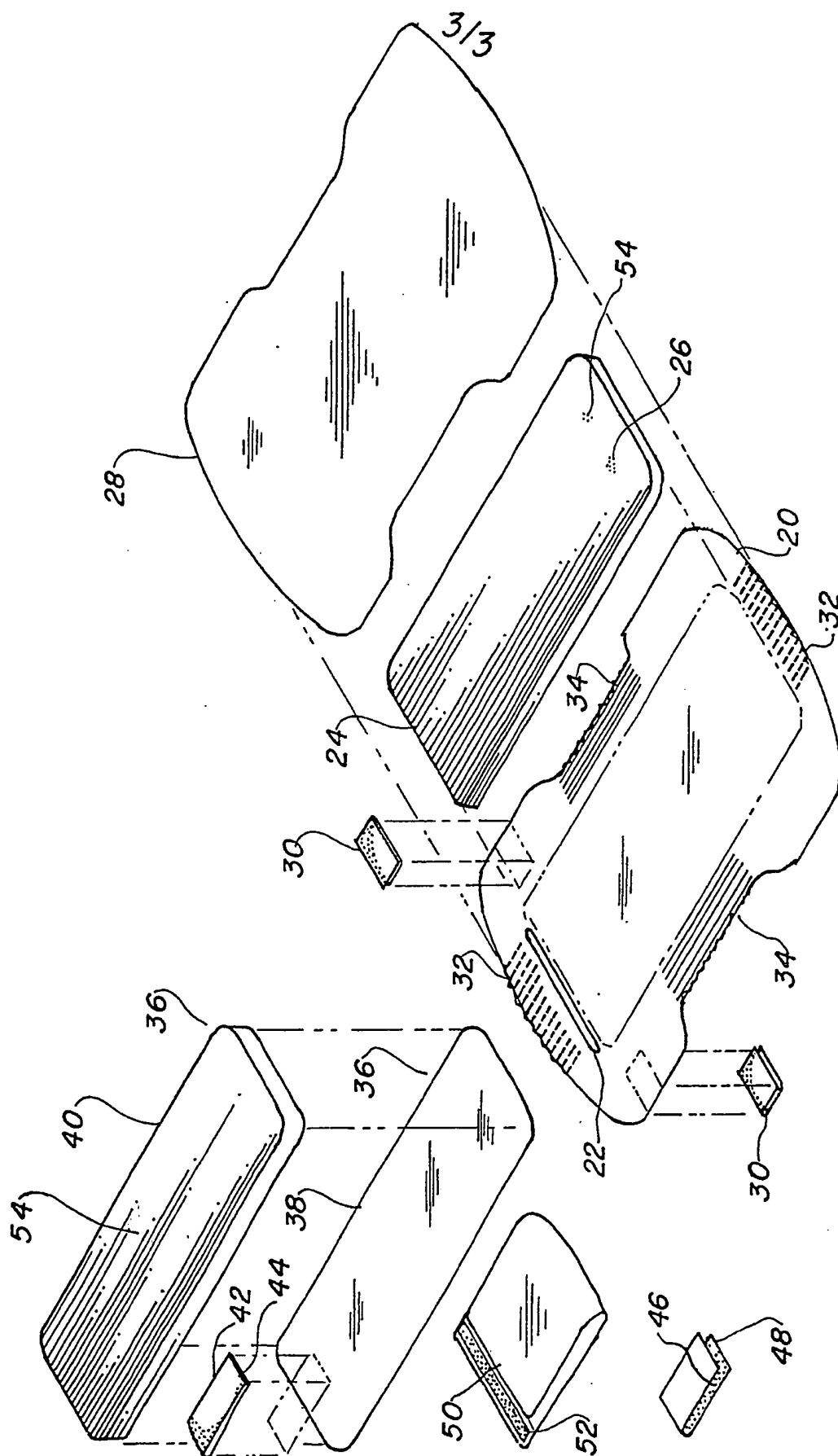


FIG. 7

# INTERNATIONAL SEARCH REPORT

International Application No PCT/US90/02302

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>3</sup> According to International Patent Classification (IPC) or to both National Classification and IPC IPC(5): A61F 13/15; A61F 13/20 U.S. CL.: 604/359																				
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched <sup>4</sup></div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">Classification System</td> <td style="width: 50%; border-bottom: 1px solid black;">Classification Symbols</td> </tr> <tr> <td style="padding: 5px;">US CL.</td> <td style="padding: 5px;">604/359, 361, 397, 398, 402</td> </tr> </table> <div style="border-top: 1px solid black; padding: 5px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>6</sup></div>			Classification System	Classification Symbols	US CL.	604/359, 361, 397, 398, 402														
Classification System	Classification Symbols																			
US CL.	604/359, 361, 397, 398, 402																			
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category <sup>8</sup></th> <th style="width: 70%; border-bottom: 1px solid black;">Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup></th> <th style="width: 20%; border-bottom: 1px solid black;">Relevant to Claim No. <sup>18</sup></th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">US, A, 1,695,153 (NELSON) 11 DECEMBER 1928 See figures 1-4 and page 1, lines 28-68.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-23</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">US, A, 2,826,199 (BRANDON) 11 MARCH 1958 See figures 1-5; column 1, lines 15-29 and 42-58.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-23</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">US, A, 4,681,575 (KNOX) 21 JULY 1987 See the abstract.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">15 and 22</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">US, A, 4,507,121 (LEUNG) 26 MARCH 1985 See figure 1, column 2 lines 18-62 and column 3, line 62 to column 4, line 2.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">8, 9, 10 and 17</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 4,352,356 (TONG) 05 OCTOBER 1982 See figures 1-3 and column 3, line 33 to column 4, line 10.</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-23</td> </tr> </table>			Category <sup>8</sup>	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>	Y	US, A, 1,695,153 (NELSON) 11 DECEMBER 1928 See figures 1-4 and page 1, lines 28-68.	1-23	Y	US, A, 2,826,199 (BRANDON) 11 MARCH 1958 See figures 1-5; column 1, lines 15-29 and 42-58.	1-23	Y	US, A, 4,681,575 (KNOX) 21 JULY 1987 See the abstract.	15 and 22	Y	US, A, 4,507,121 (LEUNG) 26 MARCH 1985 See figure 1, column 2 lines 18-62 and column 3, line 62 to column 4, line 2.	8, 9, 10 and 17	A	US, A, 4,352,356 (TONG) 05 OCTOBER 1982 See figures 1-3 and column 3, line 33 to column 4, line 10.	1-23
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>15</sup> Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>																				
<b>IV. CERTIFICATION</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;">Date of the Actual Completion of the International Search <sup>2</sup></td> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;">Date of Mailing of this International Search Report <sup>3</sup></td> </tr> <tr> <td style="padding: 5px;">29 MAY 1990</td> <td style="text-align: center; padding: 5px;">12 FEB 1991</td> </tr> <tr> <td style="border-bottom: 1px solid black; padding: 5px;">International Searching Authority <sup>1</sup></td> <td style="border-bottom: 1px solid black; padding: 5px;">Signature of Authorized Officer <sup>19</sup></td> </tr> <tr> <td style="padding: 5px;">ISA/US</td> <td style="text-align: center; padding: 5px;">           NGUYEN NGOC HO            INTERNATIONAL DIVISION            PAUL PREBILIC         </td> </tr> </table>			Date of the Actual Completion of the International Search <sup>2</sup>	Date of Mailing of this International Search Report <sup>3</sup>	29 MAY 1990	12 FEB 1991	International Searching Authority <sup>1</sup>	Signature of Authorized Officer <sup>19</sup>	ISA/US	NGUYEN NGOC HO INTERNATIONAL DIVISION PAUL PREBILIC										
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